

Ch 6 Similarity

6.1 Ratios, Proportions, and the Geometric Mean

Ratio--compares 2 numbers

$$a:b$$

$$\frac{a}{b} \quad (b \neq 0)$$

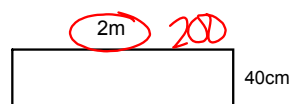
Example
1860 students
310 athletes

$310 : 1860$
Athlete: student ratio
 $1:6$

Athlete: non-athlete ratio
 $310 : 1550$
 $1:5$

Must convert to the same unit!

K H D Base D C M



$2:1$

$$\frac{200}{40} = \frac{5}{1}$$

Simplify

2 ft : 20 in

$$24 : 20$$

$$6 : 5$$

12 ft : 5 yd (3ft = 1yd)

$$12 : 15$$

$$4 : 5$$

The ratio of 2 supplementary angles is 4:5.
What are the measures of the angles?

$$4x + 5x = 180$$

$$x = 20$$

$$80^\circ \quad 100^\circ$$

The ratio of the angles in a triangle are 2:3:4.
What are the measures of the angles?

The ratio of the sides of a triangle are 5:12:13.
The perimeter is 90 cm. What are the lengths of the sides?

$$5x + 12x + 13x = 90$$

$$x = 3$$

$$15 \text{ cm}$$

$$36 \text{ cm}$$

$$39 \text{ cm}$$

Do:

1. The ratio of the angles in a triangle are 1:5:6. Find the angles.
2. The ratio of the angles in a triangle are 3:5:7. Find the angles.

Proportion—equation stating 2 ratios =

$$a \cdot d = b \cdot c$$

“a is to b as c is to d”

Cross Products Property

Product of Means = Product of the extremes

examples:

$$\text{ex 1} \quad \frac{16.2}{9.1} = \frac{9^3}{y}$$

$$y = 27.3$$

$$\text{ex 2} \quad \frac{4x-5}{31} = \frac{-26}{62}$$

$$x = -2$$

$$4x - 5 = -13$$

Geometric Mean

$$\frac{a}{x} = \frac{x}{b}$$

$$x^2 = a \cdot b$$

$$x = \pm \sqrt{a \cdot b}$$

Find the geometric mean between 24 and 48.

$$\frac{24}{x} = \frac{x}{48}$$

$$\sqrt{x^2} = \sqrt{24 \cdot 48}$$

$\hat{24}^2$

$$x = 24\sqrt{2}$$

Find the geometric mean between 12 and 27.

$$\frac{12}{x} = \frac{x}{27}$$

$$x^2 = 12 \cdot 27$$
$$x = 18$$

Find the geometric mean between 16 and 18.

6.2 Use properties to solve Geometry Problems

Additional properties of proportions

$$\frac{a}{b} = \frac{c}{d}$$

$$\frac{a}{c} = \frac{b}{d}$$

$$\frac{b}{a} = \frac{d}{c}$$

$$\frac{a+b}{b} = \frac{c+d}{d}$$

Scale--ratio describing dimensions

ex:

A room has a length of 40ft and a width of 9 ft.

A scale model has a length of 16 units. What is the width of the scale model?

$$\frac{40}{9} = \frac{16}{w}$$

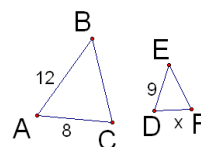
$$w = 3.6 \text{ units}$$

ex:

solve for x.

$$\frac{AB}{DE} = \frac{AC}{DF}$$

$$\frac{4}{3} = \frac{12}{x}$$



While baking muffins, Kathy noticed that the recipe for 48 muffins required 900g of flour. She then discovered that she only has 675g of flour. How many muffins can she bake?

$$\frac{48}{900} = \frac{x}{675}$$

$$x = 36 \text{ muffins}$$

A map scale states that every 2 in is 76mi. If the distance, on the map, between two cities is 5in, what is the actual distance between the two cities?

$$\frac{2}{76} = \frac{5}{x}$$

$$x = 190 \text{ mi}$$

A flagpole casts a shadow 22ft long. If a man 6ft tall casts a shadow of 4ft, how tall is the flagpole.

$$\frac{x}{22} = \frac{6}{4}$$

$$x = 33 \text{ ft}$$

HW

p360-363 #s 3-5, 7-9, 14, 15, 18-20, 29, 30, 34, 35, 60, 65

p367 #s 7-10